

Bonding WS 1

Name: KEY p. _____

Fill in the following chart:

Electronegativity Difference	Bond Type	Example
0.0 - 0.3	nonpolar covalent	F ₂
0.3 - 1.7	polar covalent	HCl, CO ₂
1.7 +	IONIC	NaCl, CsF

1) At around which electronegativity (EN) difference do bonds go from covalent to ionic? 1.7

2) What is the main difference between an ionic bond and a covalent bond?

Ionic Bonds = valence e⁻ transferred to more EN atom
Covalent = valence e⁻ shared between atoms

3) Based on the EN difference, determine which type of bond (ionic or covalent) would exist in each substance listed.

- a) NaF ^{3.1} I b) SO₂ ^{1.0} PC c) PCl₃ ^{0.9} PC d) Rb₂O ^{2.7} I
 e) NO ^{0.5} PC f) Br₂ ^{0.0} NPC g) KI ^{1.7} I i) ZnF₂ ^{2.4} I

4) IONIC BONDING: Write the correct balanced formulas that would exist between each metal and nonmetal after the electrons are transferred.

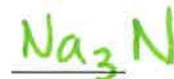
⁺¹ ⁻¹
Li and Cl



⁺² ⁻¹
Ba and F



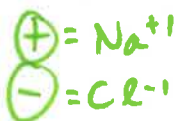
⁺¹ ⁻³
Na and N



⁺¹ ⁻²
K and S



5) Draw a diagram of the crystal lattice of NaCl (2D or 3D if you are inclined):



(+ surrounded by -)

6) When the following metals oxidize (lose electrons), what will their resulting charge be?

Al +3 Ca +2 Li +1 Be +2 Mg +2

7) When the following nonmetals are reduced (gain electrons), what will their resulting charge be?

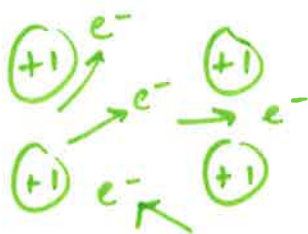
I -1 Se -2 P -3 F -1 N -3

8) Why do metals tend to lose electrons in ionic bonds, and why do nonmetals gain those electrons?

metals are less electronegative, ∴ they have a weak hold on their valence electrons

9a) Diagram the **metallic bonding** (sea of electrons) present in the following metals. Only draw the valence electrons in the diagram.

a) Na $1 e^-$ per nuclei



b) Mg $2 e^-$ per nuclei



c) Al $3 e^-$ per nuclei



9b) Based on your diagram, which metal would have the highest vaporization temperature? Explain your reasoning.

Al - it has the most electron "glue" between each nucleus. The floating electrons hold together the metal at higher temps

10) Determine the balanced formula of the resulting IONIC compound if the following metal and nonmetal were to bond ionically:

a) Na and F: NaF

b) Ca and Br: CaBr_2

c) Al and O: Al_2O_3

d) Sr and P: Sr_3P_2

e) Cs and S: Cs_2S

f) Ga and Se: Ga_2Se_3

11) Name the above compounds from #10 using ionic naming rules:

a) Sodium fluoride

b) calcium bromide

c) aluminum oxide

d) strontium phosphide

e) cesium sulfide

f) gallium selenide

12) Covalent compounds are named differently since there are no charged particles to balance. You use the prefix system. Name the following covalent compounds:

a) CO carbon monoxide

b) N_2O dinitrogen monoxide

c) NO_2 nitrogen dioxide

(laughing gas)

(smog)